

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number  
**WO 2004/008437 A3**

(51) International Patent Classification<sup>7</sup>: **G10L 19/06**

(21) International Application Number:  
PCT/IB2003/003152

(22) International Filing Date: 11 July 2003 (11.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
02077870.0 16 July 2002 (16.07.2002) EP

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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,

LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

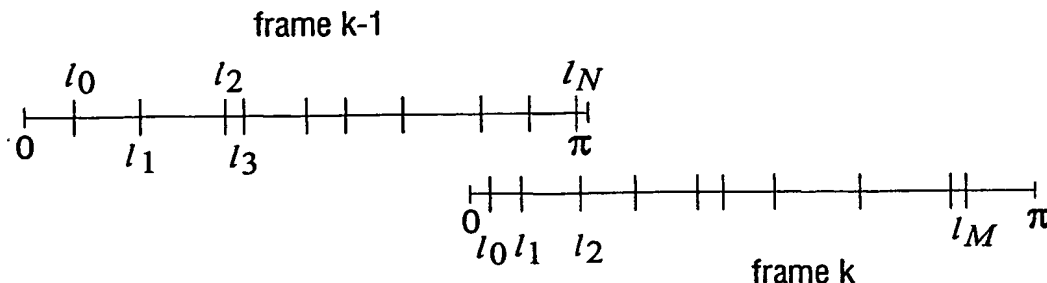
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

**Published:**

— with international search report

[Continued on next page]

(54) Title: AUDIO CODING



(57) Abstract: According to a first aspect of the invention, at least part of an audio signal is coded in order to obtain an encoded signal, the coding comprising predictive coding the at least part of the audio signal in order to obtain prediction coefficients which represent temporal properties, such as a temporal envelope, of the at least part of the audio signal, transforming the prediction coefficients into a set of times representing the prediction coefficients, and including the set of times in the encoded signal. Especially the use of a time domain derivative or equivalent of the Line Spectral Representation is advantageous in coding such prediction coefficients, because with this technique times or time instants are well defined which makes them more suitable for further encoding. For overlapping frame analysis/synthesis for the temporal envelope, redundancy in the Line Spectral Representation at the overlap can be exploited. Embodiments of the invention exploit this redundancy in an advantageous manner.



(88) Date of publication of the international search report:  
13 May 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

From the INTERNATIONAL SEARCHING AUTHORITY

**PCT**NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

To:

PHILIPS INTELLECTUAL PROPERTY &  
STANDARDS

Attn. Groenendaal, A.W.M.

Prof. Holstlaan 6

NL-5656 AA Eindhoven

NETHERLANDS

- 6 FEB. 2004

ECEU

Date of mailing  
(day/month/year)

09/02/2004

Applicant's or agent's file reference

PHNL020694WO

**FOR FURTHER ACTION**

See paragraphs 1 and 4 below

International application No.

PCT/IB 03/03152

International filing date  
(day/month/year)

11/07/2003

Applicant

KONINKLIJKE PHILIPS ELECTRONICS N.V.

- 1.
- ☒
- The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.**Where?** Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35**For more detailed instructions, see the notes on the accompanying sheet.**

- 2.
- ☐
- The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

- 3.
- ☐
- With regard to the protest**
- against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

- 4.
- Further action(s):**
- The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority

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Authorized officer

Franco Spanu

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference  PHNL020694WO	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No.  PCT/IB 03/03152	International filing date (day/month/year)  11/07/2003	(Earliest) Priority Date (day/month/year)  16/07/2002
Applicant  KONINKLIJKE PHILIPS ELECTRONICS N.V.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the International application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☒ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.
- 4 ☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

P B 03/03152

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G10L19/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, WPI Data, PAJ, COMPENDEX, IBM-TDB

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>KUMARESAN R ET AL: "On representing signals using only timing information" JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA, NOV. 2001, ACOUST. SOC. AMERICA THROUGH AIP, USA, vol. 110, no. 5, pages 2421-2439, XP001176748 ISSN: 0001-4966 abstract paragraph '000I! paragraph '00VC! paragraph '0VII! figure 13</p> <p style="text-align: center;">--- -/--</p>	<p>1-6, 14, 15, 18-20, 23-26</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

21 January 2004

Date of mailing of the international search report

09/02/2004

Name and mailing address of the ISA

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Authorized officer

Van Doremalen, J

## INTERNATIONAL SEARCH REPORT

International Application No

P B 03/03152

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>KUMARESAN R ET AL: "On the duality between line-spectral frequencies and zero-crossings of signals"</p> <p>IEEE TRANSACTIONS ON SPEECH AND AUDIO PROCESSING, MAY 2001, IEEE, USA, vol. 9, no. 4, pages 458-461, XP002264935</p> <p>ISSN: 1063-6676</p> <p>abstract</p> <p>paragraph '000I!</p> <p>page 459, right-hand column, line 64 - line 65</p> <p>page 459, left-hand column, line 9 - line 11</p> <p>paragraphs '0V.B!', '!', '00VI!</p>	1-5,14,15,18
A	<p>US 5 749 064 A (PAWATE BASAVARAJ I ET AL)</p> <p>5 May 1998 (1998-05-05)</p> <p>abstract</p> <p>column 6, line 21 -column 7, line 10</p>	6,16,21
A	<p>WONG J W C ET AL: "Fast time scale modification using envelope-matching technique (EM-TSM)"</p> <p>CIRCUITS AND SYSTEMS, 1998. ISCAS '98. PROCEEDINGS OF THE 1998 IEEE INTERNATIONAL SYMPOSIUM ON MONTEREY, CA, USA 31 MAY-3 JUNE 1998, NEW YORK, NY, USA,IEEE, US, 31 May 1998 (1998-05-31), pages 550-553, XP010289950</p> <p>ISBN: 0-7803-4455-3</p> <p>abstract</p> <p>paragraph '03.2!</p>	6,16,21
A	<p>WO 99 18565 A (NOKIA MOBILE PHONES LTD ;LAKANIEMI ARI (FI); OJALA PASI (FI); RUOP) 15 April 1999 (1999-04-15)</p> <p>abstract; claims 12,16,17</p> <p>page 13, line 10 - line 28</p>	1-3,5-7,9,14-16,19-21,23
A	<p>EP 0 899 720 A (TEXAS INSTRUMENTS INC)</p> <p>3 March 1999 (1999-03-03)</p> <p>abstract; claims 1,2</p>	1-3,5,14,15,19,20

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

P B 03/03152

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5749064	A	05-05-1998	JP	9325794 A	16-12-1997
WO 9918565	A	15-04-1999	FI	973873 A	03-04-1999
			AU	9164998 A	27-04-1999
			DE	69804121 D1	11-04-2002
			DE	69804121 T2	31-10-2002
			EP	1019907 A2	19-07-2000
			WO	9918565 A2	15-04-1999
			JP	2001519551 T	23-10-2001
			US	6202045 B1	13-03-2001
EP 0899720	A	03-03-1999	EP	0899720 A2	03-03-1999
			JP	11143498 A	28-05-1999